PRESCRIBED GRAZING (528A)

SPECIAL CONSIDERATIONS AND USEFUL REFERENCE TABLES FOR APPLICATION OF PRESCRIBED GRAZING

By

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SPECIAL CONSIDERATIONS	
AERATION	PARASITE CONTROL
BALANCING THE FORAGE SYSTEM	PREGNANCY TESTING
CALVING SEASON	SHADE
EROSION	STOCKING RATE
ECONOMICS	STOCKING DENSITY
FLOODING	STOCKPILING
FORWARD GRAZING	TALL FESCUE ENDOPHYTE
LEGUME MAINTENANCE	TOXICITY
MANAGEMENT OF OVERGRAZED OR ABUSED FORAGE PLANTS	WATER
NUTRIENT MANAGEMENT	WEED CONTROL
NUTRITIONAL NEEDS	WILDLIFE

TABLES:

A.

Aeration

Dragging a pasture with a harrow or other tool may benefit nutrient management, but economics of the practice are questionable. Aeration of pastures is typically only economical when done in association with a renovation practice.

Spreading of manure piles is best accomplished by maintaining high stocking density. When stocking density is high, hoof action will spread the manure.

B. Balancing the Forage System

When planning rotational grazing systems, consider land user's objective, management skills, and time available, then inventory the resources water, soil capability, slope and aspect, forage, existing fences, livestock numbers, and shade.

Consider developing a forage system that provides grazing forage or crop residue for most of the year. When fields need reestablishing, be aware of the possible voids in the forage system and plant forage that can help fill the gap. Typical operations have a gap in August, September, December, January, February, and early March. The following is one possible combination of forages to extend grazing seasons.

MONTH	FORAGE SYSTEM
January	Stockpiled Forage (Tall Fescue)
February	Winter Annuals (Wheat, Rye)
March	Winter Annuals (Wheat, Rye)
April May	Cool Season Grass and Legumes (Tall Fescue, Orchardgrass)
June July August	Warm Season Forages (Eastern Gamagrass, Bermudagrass, Crabgrass)
September October November	Warm Season Annuals and Cool Season Grasses and Legumes or Crop Residue
December	Stockpiled Forage from Fall Growth

Consider planting 10–30 percent of the forage system in warm season forages and possibly overseeding them with cool season annuals.

Forages are classified into two groups according to photosynthetic pathway, C3 (cool season grasses) and C4 (warm season grasses). C3 grasses are lower fiber and typically higher quality. C4 grasses are typically more drought tolerant and higher in fiber and lower quality relative to C3 grasses. The optimum growth ranges are listed below:

Table 1: Optimum Temperature for Growth

Grass	Optimum Temperature Range
Cool Season (e.g.,Tall Fescue, Orchardgrass)	59ºF.-86ºF.
Warm Season (e.g., Bermudagrass)	77ºF.-104ºF.

C. Calving Season

Consider having beef cows on a 60-90-day calving season. Management of cattle is much more efficient and cattle are more marketable if a uniform group is sold. Consider conducting a breeding soundness exam on herd sire annually.

D. Erosion

When crop residues are present, graze them soon after harvest of grain for the highest quality and lowest toxicity (e.g., aflatoxin). Grazing crop residue removes nutrients for the next year's crop and leaves the soil more vulnerable to soil erosion. Rotate livestock before too much residue is removed.

Locate fences to discourage erosion on slopes. Trails are prone to erosion (e.g., offset fence on long or steep slopes to allow runoff water to exit cow path on fence line). Manage cattle to prevent paths through rotational grazing, vegetation management, and/or proper location of fences, gates, and facilities (hay feeding, mineral, water points, etc.). Do not graze erosive areas when soils are saturated.

Protect streambanks from erosion.

E. Economics

Seventy percent of the cost to feed a cow is in the hay. Hay costs one and one-fourth to two times the cost of grazing. The savings per cow can be as high as 35 percent per cow.

F. Flooding

Consider flooding conditions, and when fencing, provide livestock with access to an area not subject to flooding to prevent trapping and drowning of animals. High tensile fencing is the most desirable for floodplain areas. The fewer posts and wire(s) and the higher the wire(s) the greater likelihood of maintaining the fence (See Fencing standard 382).

G. Forward Grazing

Forward grazing can provide significant benefits to the producer. Graze animals requiring a higher nutrition diet ahead of those requiring less nutrition (e.g., creep grazing calves ahead of lactating cows followed by dry cows).

H. Identification

Consider identifying livestock with ear tags, freeze brand, or another form of marking, so management decisions can be made more effectively.

I. Legume Maintenance

Consider practicing management that will maintain legumes. Maintain adequate potassium and phosphorous and prevent shading of clovers by grass.

A good rotational plan will help maintain legumes. If annual lespedeza is present, graze hard in April and May.

J. Management of Overgrazed or Abused Forage Plants

Overgrazed, abused forage plants should be allowed to recover for a growing season. The aftermath may be harvested for hay (see Forage Harvest Management 511).

Cool Season Forages: April 1-June 15 (e.g., tall fescue, and orchardgrass).

Warm Season Forages: May 1-July 15 (e.g., bermudagrass and Eastern gamagrass.)

K. Nutrient Management

Grazing cattle return 75 percent of the nitrogen (50 percent of N is lost due to volatilization, 37.5 percent returned to the ground), 80 percent of the phosphorus and 85 percent of the potassium; however, unless intensive grazing management is practiced, a small percentage is returned to the field. Most of the manure is dropped under the shade, near the hay feeding area, or around the watering facility.

Fertilize pasturelands with nitrogen according to the University of Tennessee recommendations and animal and forage needs (see Nutrient Management standard 590). Typically, the greatest demand for cool season forage is in the winter; therefore, stockpiling fall growth for winter use is advisable. Stockpiling cool season forages in the fall is successful three out of five years. Unsuccessful years are due to no rainfall. Spring nitrogen may not be needed on all pastureland, if excess production will not be used for stored feed.

Typically, the order of nutritional need for beef cattle from the highest to the lowest, according to class of animal, is calves, superior milking cows, average milking cows, and dry mature beef cows (See Table 7).

The highest nutritional need and peak milk of mature beef cows is approximately 50 days after calving. For beef heifers, peak milk and greatest nutritional need is approximately 30 days after calving.

L. Parasite Control

Typically, worm cycles are from less than 28 days; therefore, a rest period of 28 days or more will help break the worm growth cycle.

Rotate chemistry of fly tags every year and incorporate other methods of control such as spraying and back rubbers as needed.

M. Pregnancy Testing

Consider conducting pregnancy tests on cows 45 or more days after the bull has been removed from the cowherd.

N. Shade

Use of natural or artificial shelter will be included as part of this practice, when conditions demand. Generally, shade is desirable when temperatures are in excess of 80ºF., high humidity, and there is no nighttime cooling (nighttime temperatures do not drop below 58ºF.).

O. Stocking Rate

Stocking rate (animals/operation) relates to output of animal product, persistence of forage species, productivity of forage species, and economic return. A low stocking rate may under utilize forage, decrease legume component, and not return sufficient income; however, a high stocking rate is costly due to the need for more hay and overgrazing lowering pasture vigor and production. Stocking rate should be based on soil, management, capital, labor, and land user's objective. Estimate stocking rate using the Graze.xls Excel spreadsheet or the Grazing Lands Application module (GLA).

P. Stocking Density

Stocking density (animals/acre) is a tool to improve forage utilization, weed control, manure distribution, and/or seed soil contact through trampling in of broadcast seed.

Q. Stockpiling

Forage produced in September, October, and November is grown and held for use later in the winter. It is recommended to stockpile one to one and one-half acre per animal unit. Clip or graze fields planned for stockpiling before September 1. Fertilize with 60 lbs. of nitrogen September 1.

Typically, leaves can only be stockpiled for approximately 60 days, and then negative impacts occur. Cool season stockpiled forage can be held longer in the fall due to the fact that little to no re-growth is occurring in the winter. Spring cool season forage typically does not stockpile well for later use in the summer.

R. Tall Fescue Endophyte

Endophyte in tall fescue has several adverse effects on the animal:

- Higher body temperature.
- Lower feed intake.
- Lower weight gains.
- Lower milk production.
- Higher respiration rates.
- Rough hair coat.
- More time spent in water.
- More time spent in shade.
- Less time spent grazing.
- Excessive salivation.
- Reduced blood serum prolactin levels.
- Reduced reproductive performance.

Steers grazing non-infected tall fescue gained an additional 0.82 lbs./day versus steers grazing infected tall fescue. Pregnancy rate of beef cows was 34 percent higher on low endophyte versus high endophyte pasture.

Horses are extremely sensitive to the fungus toxin. Therefore, it is recommended to remove mares from infected tall fescue a minimum of 30 days, and best if removed as much as 90 days before foaling.

Several options exist for reducing or eliminating the endophyte problem. These options are:

1. Plant another species.

2. Plant endophyte-free tall fescue (takes a high degree of management to maintain a stand).

3. Dilute endophyte with legumes (not effective for horses).

4. Plant a new Max Q variety of tall fescue.

S. Toxicity

If poultry litter is used as fertilizer on pastureland, be aware that excess potassium can cause an increased incidence of grass tetney due to inadequate uptake of magnesium. When grass is growing fast, especially in spring, it is advisable to feed high magnesium mineral to all lactating livestock. Blood serum magnesium level should be above 20 ppm.

Consider prussic acid toxicity (cyanide poisoning), when grazing johnsongrass or sorghum crosses. Two weeks after a killing frost, these forages may be safely grazed. Do not graze forages when the forage dry matter exceeds 200 ppm.

T. Water

Table 2: Travel Distance to Water

Rating and Class Animal Ideal	Distance (Feet)
Dairy Cows	<=600
Beef Cows	<=600
Beef Cows	<=800
Adequate	
Beef Cattle	801-1,200
Needs Improvement	
Beef Cattle	>1,200[1]

[1] Livestock prefer water near their body temperature. If the travel distance to water is over 900 feet, cattle travel as a herd, which increases the demand on the water tank and pipeline system recharge capacity.

Testing of water supplies is advised when there are any problems or if the source is questionable. Water contaminants should be below the following concentrations.

Table 3: Water Quality

Contaminant	Concentration
Nitrate	<100 ppm
Sulfate	<350 ppm
Total Dissolved Solids	<3,000 ppm
Blue Green Algae	Very Low Presence
Coliform Bacteria	For Grade A Dairy, Meet Milk Inspection Standards.

Supplemental feed may be necessary to meet the desired nutritional levels for animals. Placement of supplemental feed should be considered to reduce negative impacts to soil, water, air, plant, and animal resources. To discourage loafing of animals, it is generally best to separate facilities (water, shade, mineral, and hay, e.g., locate facilities on opposite ends of the field).

U. Weed Control

A stock density of 10,000 lbs./ac. or greater will benefit manure distribution, pasture utilization, and weed management. Forage availability and number of days on a paddock are not considered. Proper grazing heights must be maintained to assure an adequate supply of forage is available to the animals.

Change management periodically and allow varying recovery times for forages to break weed cycles and make forages more vigorous (e.g., stockpile different fields for grazing, cut different fields for hay, or graze different paddocks at different times).

V. Wildlife

Prescribed Grazing should consider the needs of other enterprises utilizing the same land, such as wildlife and recreational uses. (See Wildlife Upland Habitat Management Standard 645.)

Delay mowing until after August 15, if nesting game birds are a concern. Consider use of native warm season grasses in the grazing system.

W. Other Considerations

It is not recommended to harvest forage rejected after grazing for hay. The residue remaining after grazing has low quality and low yield. It is much more advisable to practice rotational grazing and reserve a paddock for hay during the primary growing season, typically 28 days or longer.

Grazing formulas may be used to estimate number of paddocks needed, acreage per paddock, days of grazing, stocking rate, etc. (See Table 12).

Other tables located in the Appendix: Normal Body Temperatures (Table 10), Gestation Periods (Table 11), Features of Reproductive Cycle (Table 13), and Body Condition Scoring (Table 14).

X. Terms and Definitions

Animal Unit (AU) - 1,000-pound cows with a calf through weaning. A good target weaning weight is 50 percent of the cow's weight (e.g., 500 lbs.).

Animal Unit Day (AUD) - The amount of dry forage consumed by one animal unit per day (e.g., 1,000 lbs. x .026 {forage consumed in percent body weight} = 26 lbs./day).

Animal Unit Month (AUM) - The amount of dry forage consumed by one animal unit for one month (e.g., 26 lbs./day x 365 days = 9,490 divided by 12 months = 790.8 lbs./AUM).

Animal Unit Year (AUY) - The amount of forage consumed by one animal unit for one year, 26 lbs./day x 365 days/year = 9,490 lbs./year.

Body Condition Score (BCS) - The amount of stored fat in an animal. For beef cattle, a score of one to nine is assigned, one being emaciated and nine severely obese. A score of six is generally considered on target. There is a direct relationship between BCS and conception rates (See Tables 14 and 15).

Creep Grazing - The practice of allowing juvenile animals to graze areas that their dam cannot access at the same time. It is a form of forward grazing.

Dry Matter - The substance in a plant remaining after oven drying to a constant weight**.**

Growth Curve, Plant - Typically expressed in percent of growth per month (e.g., 60 percent of tall fescue growth by July).

Heifer - A female less than three years old without a calf.

Paddock - A grazing area that is a subdivision of a grazing management unit.

Protein, Crude - An estimate of protein content based on a determination of total nitrogen content multiplied by 6.25, because proteins average about 16 percent N.

Put and Take Stocking - The use of variable animal numbers during a grazing period or season in an attempt to maintain desired quantity of forage and grazing pressure.

Recovery Period - Length of time that a specific land area is allowed to rest, primarily for carbohydrate replenishment.

Stocker - Young cattle, post weaning, generally being grown on forage diets to increase size before going to feedlots.

Stocking Density – Number of Animals Per Acre $\frac{\text{No. of Animals Grazing}}{\text{Paddock Size (Acres)}}$
Stocking Rate – Number of Animals Per Total Forage Acres $\frac{\text{No. of Animals Grazing}}{\text{Total Acres of Forage}}$

Stockpiled Forage - Forage grown in one season and held for use in another season. Typically, fall forage is held for use in the winter. Tall fescue is commonly used; however, bluegrass and orchardgrass can be used in a stockpiling program. Tall fescue stands longer into winter.

FORAGE TABLES:

Table 4: RECOMMENDED GRAZING HEIGHTS[1]

Forage Species[4]	Height to Begin Grazing[2]	Height to Terminate Grazing (Residual Ht.) [3]	Recovery Time (Days)
Tall Fescue Timothy Annual Ryegrass Crabgrass Old World Bluestem	8”	(2) 3”	14 – 45
Tall Fescue (Endophyte Free) Orchardgrass Sericea Lespedeza	8”	(3) 4”	14 – 45
Wheat Rye Oats	8”	4”	14 - 45
Alfalfa	Bud Stage	2”	24 - 32
Pearl Millet	12”	6”	14 – 30
Sorghum X			
Sudangrass Hybrids	18”	(6) 8”	14 – 30
Johsongrass Native Warm Season Grasses (NWSG)	22”	(8) 10”	30 – 50
Common Bermudagrass Hybrid Bermudagrass	8” 8”	2” 3”	14 - 45

[1] Grazing periods generally need to be short 1 to 14 days with 14 to 21 days of recovery during optimum growing season and 21 to 45 days or longer during periods of less than optimum conditions.

[2] Height to begin grazing is important to assure adequate quantity is available and plant recovery is sufficient to maintain a healthy stand. Paddocks may be grazed at the listed lower height realizing that quantity of forage produced and presented to the animal will be reduced. In addition, plant vigor will be reduced. The grazing and recovery period needed for forages varies according to growing conditions.

[3] Minimum grazing height listed in () may be used when rotational grazing (days on a particular field is 14 days or less) is practiced and the minimum or higher recovery height to begin grazing is practiced. When determining height to terminate grazing, use the lowest height measured, not the average height.

[4] Alfalfa, Bermudagrass, Old World bluestem, and sericea should be at least 6” to 8” tall before the first frost. Johnsongrass and NWSG should be at least 12” tall prior to the first frost. Providing other forages with a recovery period prior to frost is also beneficial to forage vigor.

Table 5: Approximate Hay Yield, Crude Protein, and Total Digestible Nutrient (TDN) Content of Various Hay Crops.

TYPE OF HAY CROP	Annual/ Perennial	Usual Hay Yield (tons/A)[1]	Usual[2] Crude Protein, %	Usual TDN,%[2]	TYPE OF HAY CROP	Annual/ Perennial	Usual Hay Yield (tons/A)[1]	Usual[2] Crude Protein, %	Usual TDN,%[2]
Cool Season					***Warm Season***				
Alfalfa (Early Bloom)	P	3-6	17-22	57-62	Annual Lespedeza	A	1-2	14-17	52-58
Arrowleaf Clover	A	2-3	14-17	56-61	Hybrid Bermudagrass	P	5-8	10-14	52-58
Oats	A	1-4	8-10	55-60	Common Bermudagrass	P	2-6	9-11	50-56
Orchardgrass	P	2-5	12-15	55-60	Dallisgrass	P	2-4	9-12	50-56
Red Clover	P	2-4	14-16	57-62	Johnsongrass	P	2-5	10-14	50-60
Rye	A	1-4	8-10	50-55	Pearl Millet	A	2-6	8-12	50-58
Ryegrass	A	1-4	10-16	56-62	Sericea Lespedeza	P	1-3	14-17	52-58
Soybean	A	2-3	15-18	54-58	Sudangrass	A	2-6	9-12	55-60
Tall Fescue	P	2-4	10-15	55-60					

[1] Assuming the crop is grown in an area to which it is adapted using recommended production and harvesting practices.

[2] Dry matter basis, assuming recommended production and harvesting practices, and no excessive weather damage. Forage quality is affected by many factors, but primarily maturity. Grazed vegetative forage will typically be two to four percentage points higher in crude protein and TDN.

Table 6: Grazing Efficiency Total Season Per Herd[1]

Number of Pasture Paddocks	Approximate Days on Each Field	Grazing Efficiency
Continuous	**>14 days**	**<=30%**
4 pasture	**9 day**	**35-45%**
5 pasture	**7 day**	**45-50%**
8 pasture	**4 day**	**50-60%**
24 pasture	**1 day**	**65%+**
Hay[2]	**-----**	**70%**

[1] Grazing efficiencies are to be multiplied by total forage production from the ground up. To convert a hay yield to total production, divide by a factor of 0.7 (See Table 11).

[2] Even though the efficiency of hay is higher than grazing systems, the cost of running equipment to harvest and feed hay does not justify the increased efficiency.

LIVESTOCK TABLES:

Table 7: Nutrient Requirements of Beef Cattle

CLASS OF ANIMAL	WEIGHT (LBS.)	AVG. DAILY GAIN (LBS.)	DRY MATTER INTAKE (LBS.)	PERCENT PROTEIN (LBS. PROTEIN)	PERCENT TDN (LBS. TDN)
Medium Frame Heifers	300	1.5	8.2	13.1 (1.08)	68.5 (5.6)
	300	2.0	8.0	15.1 (1.22)	77.0 (6.2)
	400	1.5	10.2	11.4 (1.17)	68.5 (7.0)
	400	2.0	10.0	12.9 (1.29)	77.0 (7.7)
	500	1.5	12.1	10.3 (1.25)	68.5 (8.3)
	500	2.0	11.8	11.4 (1.35)	77.0 (9.1)
	600	1.5	13.8	9.5 (1.32)	68.5 (9.5)
	600	2.0	13.5	10.4 (1.41)	77.0 (10.4)
Medium Frame Steers	300	1.5	8.7	13.2 (1.14)	63.0 (5.5)
	300	2.0	8.9	14.8 (1.32)	67.5 (6.0)
	400	1.5	10.8	11.5 (1.24)	63.0 (6.8)
	400	2.0	11.0	12.7 (1.41)	67.5 (7.4)
	500	1.5	12.8	10.5 (1.33)	63.0 (8.1)
	500	2.0	13.1	11.4 (1.49)	67.5 (8.8)
	600	1.5	14.7	9.8 (1.42)	67.5 (10.1)
	600	2.0	15.0	10.5 (1.57)	67.5 (10.1)
Two-year Heifers Nursing Calves 3-4 Mos. Old	900	0.5	19.2	10.4 (2.00)	62.7 (12.0)
Yearling Heifer (last 3rd of preg.)	800	1.4	17.4	8.8 (1.50)	59.6 (10.4)
	800	1.9	17.5	9.3 (1.60)	66.1 (11.6)
Avg. Milking Cows 10 lbs. Milk/Day	1,000	0.0	20.2	9.6 (2.00)	56.6 (11.5)
Avg. Milking Cows 10 lbs. Milk/Day	1,100	0.0	21.6	9.4 (2.00)	56.0 (12.1)
Avg. Milking Cows 10 lbs. Milk/Day	1,200	0.0	23.0	9.3 (2.10)	55.5 (12.8)
20 lbs. Milk/Day	1,000	0.0	20.6	12.3 (2.50)	67.0 (13.8)
20 lbs. Milk/Day	1,100	0.0	22.3	11.9 (2.60)	65.2 (14.5)
20 lbs. Milk/Day	1,200	0.0	23.8	11.5 (2.70)	63.7 (15.2)
Dry Pregnant Mature Cow (Mid 3rd Preg.)	1,000	0.0	18.1	7.0 (1.20)	48.8 (8.8)
Dry Pregnant Mature Cow (Mid 3rd Preg.)	1,100	0.0	19.5	7.0 (1.40)	48.8 (9.5)
Dry pregnant mature cow (Mid 3rd Preg.)	1,200	0.0	20.8	6.9 (1.40)	48.8 (10.1)
Dry Preg. Mature Cow (Last 3rd Preg.)	1,000	0.9	19.6	7.9 (1.60)	53.6 (10.5)
Dry Preg. Mature Cow (Last 3rd Preg.)	1,100	0.9	21.0	7.8 (1.60)	53.2 (11.2)
Dry Preg. Mature Cow (Last 3rd Preg.)	1,200	0.9	22.3	7.8 (1.70)	52.9 (11.8)

To determine pounds of dry matter needed to meet protein and energy requirements, divide pounds of TDN required by percent TDN in the forage or supplement and divide pounds of protein required by percent protein in the forage or supplement. Use the higher dry matter number to meet dry matter needs (e.g., see last entry, Dry Pregnancy). Mature cow 1,200 lbs. last third Pregnancy. TDN required = 11.8 lbs. needed/.529 (forage TDN value)= 22.3 dry matter required, Protein 1.70 lbs. required/ .078 (forage protein value) = 21.8 lbs. of dry matter, use higher dry matter figure of 22.3 lbs. of forage per animal. Percent dry matter consumed should typically not exceed 2.6 percent of body weight (e.g., 1,200 x .026 = 31.2 lbs.).

Table 8: Forage Intake Rate in Percent Body Weight *

CLASS OF ANIMAL	INTAKE IN PERCENT (%) BODY WEIGHT
Dry Cow	2%
Lactating Cow	3-4%
Dairy Cow	2.5-3.5% + Grain
Stocker	2.5-3.5%
Horse	2-3% + Grain
Sheep	3.5-4%

*** NRCS uses an average of 2.6 percent per animal unit/year (1,000 pound beef cow with calf through weaning). (e.g., 1,000 lb. Cow x .026 = 26 lbs. of dry matter consumed per day. Forage intake is also affected by forage quality. Animals will typically increase intake as forage quality increases.**

Table 9: Number of Cows Per Bull

Age of Bull	Number of Cows
15 months	10 – 15
18 months	15 – 18
2 years	20 – 25
Mature	25 – 35

OTHER TABLES FOR CONSIDERATION:

Table 10: Normal Body Temperatures:

Animal	Normal Temperature F.^{0} (Variation of 1ºF.)
Cattle	101.5
Goat	102
Horse	100.5
Sheep	103

Table 11: Gestation Period

Species	Days
Cattle	279–290
Goat	148–156
Horse	330–345
Sheep	144–151
Bison	270
Elk	255
Lama	330

Table 12: Grazing Equations

ACRES PER PADDOCK CONSIDERING STOCKING RATE AND FORAGE AVAILABILITY
Acres Per Paddock = An. Wt. x Intake Rate in % Body Wt. (See Table) x No. Animals x Days on Paddock / Total Lbs. Forage/Acre (See Table) x % Grazing Efficiency (See Table).
e.g. = 1,050 Lbs. An. x .026 % Body Wt. x 50 Animals x 7 days = 9,555=13 acs. / (300 Lbs./Acre Inch x 5 inches) x .50 750
Acres per Paddock may also be determined by stocking density. Research has proven that a stock density of 10,000 to 40,000 lbs./ac. provides the best nutrient management, grazing efficiency, and weed control. Forage and number of days on a paddock is not considered in this formula. Rotation would be based on the table with date to begin and terminate grazing.
OR ACRES PER PADDOCK BY STOCK DENSITY
Acres Per Paddock = Lbs. An. x An. Weight / 10,000 Lbs./Ac. Stock Density e.g. = 50 Animals x 1,050 Lbs./Animal / 10,000 Lbs./Ac. Stock Density = 5.25 acs.
DETERMINE NUMBER OF DAYS PRESENT AVAILABLE FORAGE WILL SUSTAIN HERD
Days Grazing = Total Lbs. Forage/Ac. x Acs. x % Grazing Efficiency (See Table) / Animal Wt. x Intake Rate in % Body Wt. (See Table) x Animal Lbs.
e.g. Days Grazing = 1,500 Lbs./Ac. x 13 Acs. x 0.5 Harvest Efficiency / 1,050 Lb. Animal x .026 Intake Rate x 50 Animals = 9,750 / 1,365 = 7days
OTHER FORMULAS
Days to Graze = Days Rest * e.g. 28 Days Rest / No. Paddocks-1 = 7 Days on 5 Pastures-1
Number of Paddocks = Days Rest + 1 / Days on e.g. 28 Days Rest +1 / 7 Days on = 5 Paddocks

*An average rest period of 28 days is needed for cool season forages.

Table 13: Reproductive Cycle

SPECIES	AGE AT PUBERTY	CYCLE TYPE	DURATION OF HEAT	BEST BREEDING TIME
CATTLE*	4 to 18 (12) Months. Usually First Bred about 15 Months	Polyestrous All Year	21 Days (18 to 24).	Insemination from Mid-heat until 6 Hours After End
HORSE	10 to 24 (18) Months	Seasonally Polyestrous Early Spring on	6 Days (2 to 10).	Last Few Days: Should be Bred at Two-day Intervals
SHEEP	7 to 12 (9) Months.	Seasonally Polyestrous Early Fall to Winter. Prolonged Seasons in Dorsets and Merinos.	16.5 Days (14 to 20)	24 to 48 Hours
GOAT	4 to 8 (5) Months	Seasonally Polyestrous from Early Fall to Late Winter	18 to 21 Days (19)	2 to 3 Days

* Many normal cows ovulate as early as 8 to 12 days after parturition with or without detectable external signs of estrus.

Table 14: Effect of Body Condition Score at Calving on Pregnancy Percentage on 90-day Breeding Season

Body Condition Score	Pregnancy Percentage
4	50
5	81
6	88
7	90

Table 15: Description of Body Condition Scoring (BCS) of Beef Cows

1.	**Severely Emaciated**. Bone structure of shoulder, ribs back, hooks, and pins is sharp to the touch and easily visible. Little evidence of fat deposits or muscling.
2.	**Emaciated**. Little evidence of fat deposition but some muscling in the hindquarters. The backbone feels sharp to the touch.
3.	**Very Thin**. No fat on ribs or brisket, and some muscle still visible. Backbone easily visible
4.	**Thin**. Ribs easily visible, but shoulders and hindquarters still showing fair muscling. Backbone visible.
5.	**Moderate to Thin**. Last two or three ribs cannot be seen unless animal has been shrunk. Little evidence of fat in brisket, over ribs, or around tailhead.
6.	**Good Smooth Appearance Throughout**. Some fat deposits in brisket and over tailhead. Ribs covered and back appears rounded.
7.	**Very Good Flesh, Briskets Full**. Fat cover is thick, spongy, and patches are likely. Ribs very smooth.
8.	**Obese**. Back very square, brisket distended, heavy fat pockets around tailhead. Square appearance.
9.	**Rarely Observed**. Very obese. Animal's mobility may actually be impaired by excessive fat.